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Some attenuation characteristics of ultrasound waves in asphaltene suspensions of heavy oil

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© SGEM2018. Asphaltenes are one of the very important components of heavy oil. They define the viscosity of oil and provide significant problems in production, transportation and refinery of heavy crude oil. Investigation of their agglomerations under various influence parameters is necessary for optimization of production technology. The experimental results of frequency and concentration attenuation dependency of ultrasound waves in asphaltene suspensions are discussed. A toluene and binary mixture (toluene:n-heptane) with various ratios are selected for the dispersion phase. The obtained results indicate that additional attenuation has a relaxation character and depends from both asphaltene concentration and a binary mixture's ratio. If the n-heptane privileges, the system loses its stability, which results to flocculation of dispersed phase particles. Hence, resulting to significant increase in attenuation of ultrasound waves. The comparison with the analogue system models investigated by different analysis methods revealed that attenuation coefficient change might provide additional information about the structural change and phase transformations. This information may be used for the improvement of stability in oil dispersed systems. The frequency dependent values are measured in the range of 10-23 MHz. The concentration starting from 0.1 to 10 %mass is evaluated at the same frequency range.

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Keywords

Asphaltenes, Attenuation coefficients, Clusters, Dispersed systems, High molecular components, Molecular complexes, Relaxation theory, Structure absorption, Structure transformations

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